Monitoring of Enoxaparin (Clexane)
(Low Molecular Weight Heparin (LMWH))

Following the publication of the NICE guidance for 'Venous Thromboembolism – Reducing the Risk in patients admitted to hospital', it is likely more patients will be prescribed LMWHs. In addition, the NPSA have produced a rapid response report titled 'Reducing treatment dose errors with low molecular weight heparins' (http://www.nrls.npsa.nhs.uk/resources/?EntryId45=75208). As a result, it is important to understand the risks of these types of drugs and the monitoring parameters required around their use.

Enoxaparin is classified as the following by the South of Tyne and Wear Group (SoTW):

- For travel prophylaxis, DVT treatment or use during pregnancy = **GREEN +**
- For prophylactic use (except pregnancy) = **GREEN +**
- Post operative use = **RED**

For **RED** indications prescribing should remain with the initiating Specialist.

For **GREEN +** indications, it is accepted that some drugs should be initiated by a primary Care or Secondary Care specialist but can be safely maintained in primary care without on-going specialist monitoring.

Checklist and monitoring for Prophylactic doses of Enoxaparin (Clexane®) for VTE (Low Molecular Weight Heparin (LMWH))

Surgical patients will be:

- *moderate risk*, 20mg (2000 units) 2 hours before surgery then 20mg (2000 units) every 24 hours;
- *high risk* (e.g. orthopaedic surgery), 40mg (4000 units) 12 hours before surgery then 40mg (4000 units) every 24 hours (subcutaneously)
- treatment should be continued until the patient is mobilized

Medical patients will be:

- 40mg (4000 units) every 24 hours (subcutaneously)

For severe renal impairment (Creatinine Clearance < 30ml/min)

- 20mg (2000 units) every 24hours (subcutaneously)

Doses given are as a guide only and should not be used as a basis for prescribing, for full dosing information consult the BNF or Summary of Product Characteristics.

Monitoring requirements:
There are no routine monitoring requirements for prophylactic dosing, however, monitoring of Anti-Xa may wish to be considered in some patient groups who are on long-term treatment where there may be a risk of drug accumulation and risk of overdose e.g. in patients with renal failure.

Common adverse effects:

- Reversible mild non-immunologically-mediated thrombocytopenia (type 1)
- Haemorrhage
- Transient elevation of liver transaminases (ASAT/ALAT)
- Subcutaneous haematoma at injection site

Long term treatment:

- Hypoaldosteronism (leading to increases in plasma potassium levels)
- Hyperkalaemia (especially in patients with diabetes mellitus, chronic renal failure)
- Possible link to osteoporosis (although yet to be confirmed with enoxaparin specifically)

For full information about the monitoring requirements of treatment doses, drug interactions, cautions and contra-indications consult the BNF online (www.bnf.org.uk) or electronic Medicines Compendium (www.medicines.org.uk).

References:

SPC Clexane® http://www.medicines.org.uk/EMC/medicine/24345/SPC/Clexane+pre-filled+syringes/#CLINICAL_PRECAUTIONS

British Journal of Haematology 'Guidelines on the use and monitoring of heparin' http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2141.2005.05953.x/full

Checklist and monitoring for treatment doses of Enoxaparin (Clexane®) for VTE (Low Molecular Weight Heparin (LMWH))

Treatment doses (are dependent upon the indication) and should only be prescribed by/under the direction of a Specialist.

Checklist

- Patient must be weighed prior to commencing treatment, weight (kg) should be documented on patient's medicine chart and in clinical notes
- Dose should be calculated according to patient weight and renal function
- Check renal function when prescribing treatment doses, but should not delay the first doses being given. Dose reductions may be required dependent on the severity of any renal impairment (see Summary of Product Characteristics (SPC) for full details)
- Recommended doses for treatment of VTE (taken from the SPC) is 1.5mg / kg (150 units / kg) given as a single daily injection.
- For severe renal impairment (Creatinine Clearance < 30ml/min), reduce dose to 1mg/kg (100 units/Kg) given as a single daily injection
- Treatment of VTE in pregnancy (unlicensed indication) – based on early pregnancy body weight:-

Early pregnancy body weight	Under 50Kg	50 to 70Kg	70 to 90Kg	Over 90Kg
Dose	40mg (4000 units) twice a day	60mg (6000 units) twice a day	80mg (8000 units) twice a day	100mg (10,000 units) twice a day

Doses given are as a guide only and should not be used as a basis for prescribing, for full dosing information consult the BNF or SPC

Monitoring

Platelets should be monitored before starting treatment and then at day 5 of treatment, further monitoring will depend of whether the patient has a history of low platelet count (on advice of initiating healthcare professional). Monitoring of Activated Partial Thromboplastin Time (APTT) should only be used as an indication of overdosage (measure of bleeding). Monitoring of Anti-Xa may wish to be considered in some patient groups who are on long-term treatment where there may be a risk of drug accumulation and risk of overdose e.g. in patients with renal failure.

Communication

Where patients are being transferred between providers, (discharge) communication should include: dose, weight, renal function, indication and duration of treatment.

Treatment Dose Chart For Enoxaparin

The dose prescribed should be 1.5mg/kg subcutaneously once daily.
If eGFR <30ml/min/1.73m$_2$ - prescribe 1mg/kg once daily.

Please note, the colours in the chart relate to the colour-coding of the syringe of the corresponding dose.

Weight (kg)	Dose	Volume of syringe	Syringe size
40	**60mg**	**0.6ml**	**60mg in 0.6ml yellow**
45	**70mg**	**0.70ml**	**80mg in 0.8ml Red**
50	**75mg**	**0.75ml**	
55	**85mg**	**0.85ml**	**100mg in 1ml Black**
60	**90mg**	**0.90ml**	
65	**100mg**	**1.00ml**	
70	**105mg**	**0.70ml**	**120mg in 0.8ml Purple**
75	**113mg**	**0.75ml**	
80	**120mg**	**0.80ml**	
85	**128mg**	**0.85ml**	**150mg in 1ml Blue**
90	**135mg**	**0.90ml**	
95	**143mg**	**0.95ml**	
100	**150mg**	**1.00ml**	
105	160mg	**0.8ml x 120mg + 0.4ml x 40mg**	Please note – colour of syringe sizes reflected in the highlighted volume of syringe
110	165mg	**1ml x 100mg** + **0.65ml x 80mg**	
115	175mg	**1ml x 100mg** + **0.75ml x 80mg**	
120	180mg	**1ml x 100mg** + **0.8ml x 80mg**	
125	190mg	**1ml x 150mg** + **0.4ml x 40mg**	